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(54) APPARATUS FOR SCARING AWAY BIRDS

(71) I, JOSEPH ARMIN HIRS, a Swiss citizen, of Chilerainstrasse 5, CH-8634 Hombrechtikon, Switzerland, do hereby declare the invention, for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:–

The invention relates to a device for scaring birds from, in particular, areas in agricultural use, such as vineyards, the device having at least two ultrasonic resonators the resonant frequencies of which differ from one another and lie in the range of frequency from about 15 kHz.

An economically important application is the protection of areas in agricultural use, above all vineyards before vintage, fruit cultivations, fields during the time of sprouting of the seed, against birds which, when they invade in rather large flocks can cause considerable damage so that the proceeds from the harvest sometimes no longer covers expenses.

Of the different protective means which have hitherto been applied, ultrasonic radiation over the area to be protected has with relatively small outlay seemed to be the most efficacious. In the case of animals having small skull volumes the resonance frequencies lie in the ultrasonic range. The nearer the frequency of radiated ultrasonic waves approaches the skull resonant frequency of an animal the more disturbing and painful the ultrasonic waves heard by the animal feel. Ultrasonic waves of the skull resonant frequency of an animal may at more powerful intensity cause permanent damage to the animal, indeed even its death. By ultrasonic transmitters of a certain power, designed for the skull resonant frequency of a certain kind of bird, a so to speak "protective shield" against this kind of bird may consequently be set up for an area, for which because of the decreasing intensity of sound with the distance from the transmitter an effective radius of protection may be specified. This effective radius of protection is determined by the distance from the transmitter at which, to birds flying in, the ultrasonic intensity becomes insupportable. Since such ultrasonic transmitters can without difficulty be set up in productive areas they are in themselves ideal means of protection for keeping birds temporarily away from the areas, so that the cultivations are protected against the birds but the birds themselves are not permanently damaged or destroyed by the ultrasonic waves.

In the case of permanent radiation of ultrasonic waves of a certain frequency it has been found that the animals develop relatively quickly a certain deafness to these ultrasonic waves and thus become immune to these frequencies, so that the radius of protection of the protective device decreases fairly rapidly with time and in order to protect a certain area the power and/or the number of transmitters would have to be increased with time. In order to delay the development of this deafness in the animals it has already been proposed to alter continuously the frequency, or the intensity of the ultrasonic transmitter, i.e., to alter the radius of protection of the protective device periodically between a high and a low value. The ripening time of for example grapes in a vineyard and consequently the time of protection for the vineyard is relatively long and since the attraction to the birds to invade the vineyard becomes stronger and stronger with the ripening of the grapes the duration of stay of the birds in the area radiated by the ultrasonic waves is also prolonged, whereby habituation of the birds to ultrasonic fields of altering frequency or intensity still takes place during the ripening time and the actual radius of protection with progressive ripening is reduced more and more rapidly.

Such habituation is to be observed in the case of the employment of ultrasonic transmitters operating in accordance with this principle, so that with known apparatus reliable protection cannot be achieved at an expense which is still acceptable. Frequently, therefore, other means of defence are as hitherto employed, such as moving plastics ribbons and above all nets which guarantee a very satisfactory but because of their relatively short useful life more frequently repeating high initial costs and for the annual erection and dismantling a considerable expenditure of effort.

It is therefore the object of the invention to create a device with ultrasonic resonators for scaring birds, which for a comparatively low cost gives an adequately large radius of protection and also keeps this radius of protection essentially constant for the whole duration of the period of protection, that is, it generates an ultrasonic field to which during the period of protection the birds do not become accustomed.

A device according to the present invention comprises at least two ultrasonic resonators of different resonant frequencies lying in a range of frequencies around 15 kHz, the ultrasonic resonators being housed in a revolving turret arranged to rotate on a supporting housing and being connected to a warble generator the frequency of an output signal of which is warbled by a low-frequency signal through a frequency range containing the resonant frequencies of the ultrasonic resonators, the warble generator and a driving motor for the revolving turret being contained in the housing.

Three ultrasonic resonators may be provided, which are arranged to be rotatable about an axis perpendicular to the plane of the locality of installation and especially for scaring birds from the vineyard areas may exhibit the resonance frequencies of about 15 kHz, 16 kHz and 17 kHz. The warble frequency may then amount to about 200 Hz.

One example of a device according to the invention is explained in greater detail below with reference to the attached drawings in which there is shown in:–

Figure 1 in perspective, an apparatus for scaring birds, with three supersonic resonators;

Figure 2, a schematic diagram of the circuitry contained in the apparatus of Figure 1.

The apparatus for scaring birds, illustrated in Figure 1 exhibits as the supporting component a, for example, cubical housing 1 in which the electrical control apparatus as well as a motor are enclosed in a watertight manner. The housing 1 carries a revolving turret 2 in which are accomodated three ultrasonic resonators 3,4,5, lying in a row one below another. The ultrasonic resonators are for example, as shown, circular-diaphragm resonators of conventional construction and designed, for the frequencies 15 kHz, 16 kHz, and 17 kHz.

In service the motor in the housing 1 rotates the revolving turret at a speed lying in the range, say, from 50 to 150 r.p.m., so that the ultrasonic beams radiated from the resonators 3,4,5, cover the whole space round about. The apparatus must be switched on before dawn and may be switched off at dusk. Switching on and off is effected preferably automatically, e.g., by means of a twilight-switch 7 which is likewise accommodated in the housing 1 so that no additional maintenance is necessary and the apparatus may for quite a long time be left to its own devices.

The apparatus which advantageously is equipped for mains and battery operation is connected by a cable 6 leading from the housing 1 to the source of supply of current. In the case of the embodiment shown in Figure 1 a tubular holding-device 8 is bolted onto one side 1*a* of the housing by which the apparatus may be attached, e.g., to a vine-prop or to a post driven into the ground as a stand. The tubular holding-device 8 is equipped with a hinge 9 so that the revolving turret 2 may easily be brought into the alignment required at any time. Naturally, instead of this any other suitable holding member may also be attached to the housing 1 by the bolts 10.

Figure 2 shows in the form of a schematic diagram the electrical construction of the apparatus.

The resonators 3,4,5 of resonance frequencies 15 kHz 16 kHz and 17 kHz, accommodated in the revolving turret driven by a motor 17 are connected each via a tuning resistor R to the output A of a warble generator 11. The warble generator 11 contains essentially a first oscillator 12 for the frequency band containing the resonance frequencies of the ultrasonic resonators 3,4,5, thus in the present case for the frequency band from 15 kHz to 17 kHz; a second oscillator 13 for the generation of a signal with the warble frequency, e.g., 200 Hz; a modulator 14 to the input side of which the two oscillators 12 and 13 are connected; and an output amplifier 15 which emits the output signal from the modulator 14 amplified to the output A from the warble generator 11. For the supply to the warble generator 11 and the motor 17 a power supply unit 16 is provided, which is connected to the working current source 18, e.g., by means of a switch 18, and applies the correct working voltage to the warble generator 11 and the motor 17. The switch S belongs to the twilight-switch 7. The twilight-switch 7 is set in such a way that the

apparatus is switched on at dawn sufficiently long before sunrise and is switched off at dusk, the warble generator 11 and the motor 17 being switched on and off simultaneously via the power-supply unit 16.

Tests have shown that by use of an apparatus with an armament of ultrasonic resonators which at a distance of 70 m apply an acoustic power of 80 dB, an area of 1.5 Ha can be protected completely satisfactorily against invasion by birds. The changes of frequency taking place in rapid cyclical sequence from 15 kHz through 16 kHz to 17 kHz and so on in the ultrasonic field noticed by a bird flying down, acts upon the hearing organ of the bird like a rapid sequence of short and powerful acoustic shocks of correspondingly changing frequency, of which the acoustic shocks at skull resonance frequency are felt particularly strongly and irksomely. By this spasmodic generation of oscillations at skull resonance frequency and secondary frequencies, development of deafness towards skull resonance frequencies is obviously effectively prevented, for habituation of the bird to a ultrasonic field of that kind is not observed, so that for the duration of a required period of protection a constant value is guaranteed for the radius of protection.

The number of ultrasonic resonators, the frequency band covered by them, the distances apart of the resonant frequencies, the warble frequency and to a lesser degree also the speed of rotation of the revolving turret determine the kinds of birds which can be kept away from the area to be protected by the apparatus. These parameters of the apparatus are consequently dependant upon the geographical position of the area to be protected and may have to be determined experimentally in each case. The apparatus described above, having three resonators, a frequency band from 15 kHz up to 17 kHz, a separation of the resonant frequencies of about 1 kHz and a warble frequency of 200 Hz has stood the test best for keeping away starlings in particular from local vineyards. It can be assumed that for other geographical situations only essential alterations are necessary, in which case the establishment of the alterations to be made in each case is made considerably easier by the experiences gained.

The structural design of the apparatus may without difficulty be adapted to the special data in each case, in order always to achieve optimum efficiency. Thus the ultrasonic resonators may for example be offset with respect to one another and instead of parallel ultrasonic beams, be aligned for divergent sound beams.

WHAT WE CLAIM IS:–

1. A device for scaring away birds from, in particular areas in agricultural use such a vineyards, the device having at least two ultrasonic resonators of different resonant frequencies lying in a range of frequencies around 15 kHz, the ultrasonic resonators being housed in a revolving turret arranged to rotate on a supporting housing and being connected to a warble generator the frequency of an output signal of which is warbled by a low-frequency signal through a frequency range containing the resonant frequencies of the ultrasonic resonators, the warble generator and a driving motor for the revolving turret being contained in the housing.

2. A device according to claim 1, in which the frequency range of the ultrasonic resonators is upwards from 15 kHz.

3. A device according to claim 1 or claim 2, in which ultrasonic resonators are designed for resonant frequencies the values of which increase from resonator to resonator by between substantially 0.5 kHz to 3 kHz.

4. A device according to claim 1, claim 2, or claim 3, in which the warble frequency lies in the frequency range from about 50 Hz to about 400 Hz.

5. A device according to any one of claims 1 to 4, in which three ultrasonic resonators are provided having resonant frequencies of around 15 kHz, around 16 kHz and around 17 kHz and the warble frequency is 200 kHz.

6. A device according to any one of claims 1 to 5, in which the ultrasonic resonators are arranged in a row one under the other and the row of resonators is rotatable about a longitudinal axis.

7. A device according to claim 6, in which the ultrasonic resonators are arranged to radiate ultrasonic beams parallel with one another.

8. A device according to claim 6, in which the ultrasonic resonators are arranged to radiate divergent ultrasonic beams.

9. A device according to any one of claim 1 to 8, which includes an interval-switch for automatic and switching off and on of the warble generator and driving motor for the revolving turret simultaneously.

10. A device according to claim 9, in which the interval switch is a twilight switch.

11. A device according to claim 1, substantially as described with reference to the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

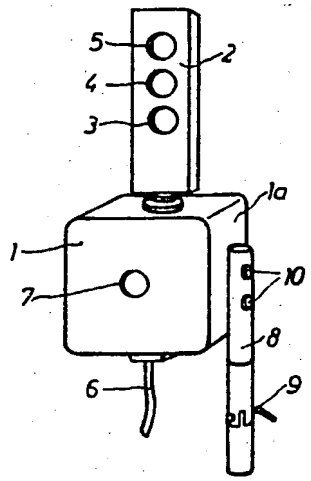

Fig.1

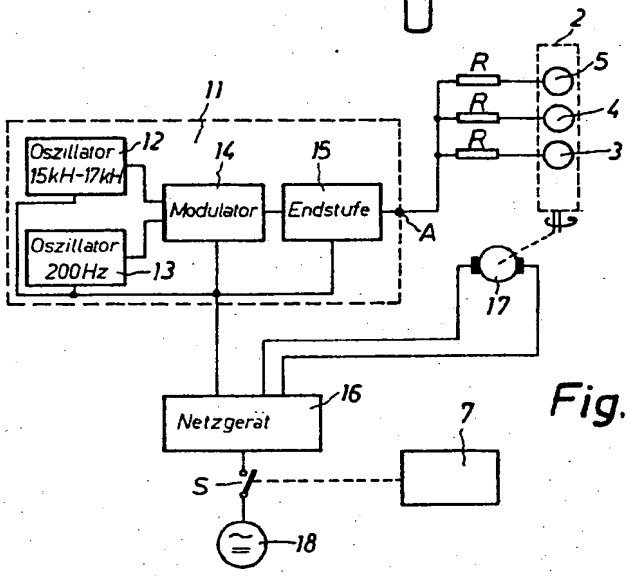

Fig.2